Ministry of Economic Development
Manatū Ōhanga
Intellectual Property Office of New Zealand

PCT/NZ03/00275

CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 16 December 2002 with an application for Letters Patent number 523204 made by Diablo Industries Limited.

I further certify that pursuant to a claim under Section 24(1) of the Patents Act 1953, a direction was given that the application proceed in the name of Henley Industries Limited.

Dated 7 January 2004.

Neville Harris
Commissioner of Patents, Trade Marks and Designs

COMMISSIONER OF PATENTS, TRADEMARKS & DESIGNS
NEW ZEALAND

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PO Box 30687, Lower Hutt, New Zealand or DX SX 11129, Wellington

523204

Patents Form No. 4

Patents Act 1953

PROVISIONAL SPECIFICATION

BRATTICE BELT

We, Diablo Industries Limited, a New Zealand company, C/o Tait Ward Adams, 65 Don Street, Invercargill, New Zealand do hereby declare this invention to be described in the following statement:

TECHNICAL FIELD

The present invention relates to an improved brattice belt.

As used herein, the term "brattice belt" means an elevator conveyor belt which is provided with a plurality of spaced protrusions and which typically is used for the transport of fibrous materials (such as wool, wood fibre, shredded paper, metal turnings and the like) from a loosely packed bulk supply.

BACKGROUND ART

There are a number of existing types of brattice belt currently in use; these are described briefly with reference to accompanying Figures 1 - 3.

Figure 1 shows, in plan view, a design of brattice belt which has been used for many years. The brattice belt 2 comprises two parallel roller chains 5,6 with a series of parallel, spaced, stainless steel laths 7 bolted between them, with the laths extending perpendicular to the length of the chains 5,6. Each of the laths 7 carries a series of stainless steel pins 8 spaced along the length of the lath and welded to the lath so as to protrude from the upper surface of the lath at an acute angle to the lath.

In use, the belt 2 extends between two spaced pairs of drive sprockets (not shown) which engage the chains 5,6 to drive the belt. As the belt is driven, a mass of loose fibrous material, (e.g. wool) is dumped on one end of the belt and smaller clumps of fibres are teased out of the mass by the pins 8 and carried up to the other end of the belt.

This design is efficient in that the chains 5, 6 can flex sufficiently to give a close contact with the drive sprockets. However, the belt, being all metal, is heavy, and a further drawback is that because the pins are secured by welding, if there is any damage to the belt a complete lath must be replaced. The roller chains require lubrication and this means that the oil or other lubrication medium tends to spread on to the materials being transported by the brattice belt.

Figure 2 shows a side view of a more recent design of brattice belt. In this design, a

continuous flat flexible belt 9 carries a series of spaced rigid plastic laths 10 which are bolted to the belt by bolts 11; the laths 10 extend perpendicular to the direction of movement of the belt. Along the length of each lath 10, a series of spaced stainless steel pins 12 are driven through the thickness of the lath to extend at an acute angle to the surface of the belt.

This brattice belt functions in the same general manner as that described with reference to Figure 1, except that the drive sprockets engage the gaps 13 between adjacent laths 10 to drive the belt.

This design has the advantage that it does not require lubrication, but the construction is expensive and once the belt is fully assembled, is relatively inflexible. Further, if any part of the belt is damaged, the whole belt must be repaired or replaced.

Figure 3 shows a side view of part of a third type of brattice belt, sold under the trademark "Flextrak". In this design, a brattice belt is assembled from a series of modules 14 which are moulded from a rigid polymer and are hinged together using moulded-in pins 15. Each pin 15 engages a hook 15a moulded on one end of the module, to link adjacent modules together.

Each module 14 is formed with a cavity 16 on its underside, which can engage a drive sprocket 17, only part of which is shown. Each module 14 provides a protruding boss 18 on its upper surface; a stainless steel pin 19 is moulded into the boss 18 so as to protrude from the upper surface of the boss at an acute angle to the plane of the belt when assembled.

This design is easily assembled, and if any damage occurs to the belt, the individual modular sections can easily be replaced. However, the design has a number of disadvantages:-

- the pins 19 are moulded into the module, so if the pins are bent or otherwise damaged, the whole module must be replaced;

- the boss 18 greatly reduces the effective length of the pin 19 and thus reduces the ability of the pin to pick up fibrous material;

- the modules are rigid, and although the belt can pivot at the joints between the modules, overall the belt is rather a rigid construction which does not engage the drive sprockets efficiently.

DISCLOSURE OF INVENTION

It is therefore an object of the present invention to provide a brattice belt module and a brattice belt which overcome the above described disadvantages of the existing designs.

The present invention provides a brattice belt made from a plurality of modules which are hinged together to form the completed belt, each module being made of a flexible material; the surface of each module which forms the outer surface of the assembled belt being substantially flat and the surface of each module which forms the inner surface of the assembled belt being formed with a protruding rib which is dimensioned and arranged to engage drive sprockets for driving the belt; a majority of the modules having a plurality of spaced pins mounted along the length of said rib, with one end of each pin embedded in said rib and the other end of each pin protruding outwards from the outer surface of the module.

The present invention further provides a module for a brattice belt, said module being made of flexible material and providing a first surface which is substantially flat and an opposing surface which is formed with a protruding rib dimensioned and arranged to engage drive sprockets, said opposing surface also providing means for hingedly securing modules together; and a plurality of pins mounted in said rib, spaced along the length of said rib, with one end of each pin embedded in said rib and the other end of each pin protruding outwards from the outer surface of the module.

BRIEF DESCRIPTION OF DRAWINGS

By way of example only, a preferred embodiment of the present invention is described in detail with reference to the accompanying drawings, in which:-

Figure 4 is a plan view of the brattice belt module in accordance with the present

invention;

Figure 5 is a sectional side view on line 5 - 5 of Figure 4, on a larger scale;

Figure 6 is a plan view of brattice belt modules in accordance with Figure 4, assembled to form a section of belt;

Figure 7 is a diagrammatic side view showing a brattice belt in accordance with the present invention engaged with drive sprockets; and

Figure 8 is a side view showing the engagement of part of the brattice belt with a drive sprocket, on a larger scale.

BEST MODE FOR CARRYING OUT INVENTION

Referring to Figures 4 and 5, a brattice belt module 30 is moulded from a suitably tough, impact and abrasion resistant plastics material. One suitable material is polyurethane with durometer of approximately 95 Shore A.

Each module 30 provides a smooth upper surface 31 from which a pin 32 protrudes at an acute angle a (typically about 60 degrees) to the surface. Each pin 32 is made of stainless steel and is moulded into the module, with the base 33 of the pin encapsulated in a rib 34 formed on the underside of the module.

The rib 34 is equidistantly spaced between hinge bosses 35,36 formed along each edge of the module 30. The sides of the rib 34 and the edges of the bosses 35,36 together form the sides of a pair of parallel indentations 37 which extend down the length of each module. Each indentations 37 is dimensioned to engage the teeth 38 of a drive sprocket 39. As shown in Figures 7 and 8, each indentation 37 receives a socket tooth, and each rib 34, and each boss 35,36, engages one of the indentations 42,43 between the socket teeth.

The hinge bosses 35,36 extend outwards from each edge of the module (see Figure 4) to form a castellated edge, with the row of bosses 35 along one edge staggered relative to the row of bosses 36 along the opposite edge.

The gaps between adjacent bosses along each edge are slightly larger than the width of the bosses, so that each module can be joined to two adjacent modules by inserting the hinge bosses along each edge of the first module into the gaps between the hinge bosses along the opposite edge of each adjacent module. The modules are hinged together in this position by inserting a hinge pin 40 through the aligned apertures of the bosses.

As shown in Figure 6, many rows of modules are assembled in this way to form a completed brattice belt 41 (a closed loop) of the required length. When assembled, each row of pins 32 across the width of the belt is half-pitch out of line with the immediately succeeding and preceding rows. In use this means that material missed by one row of pins tends to get caught by the next. Modules as illustrated in Figures 4 and 5 may be used for the whole of the belt or, as shown in Figure 6, the longitudinal edges of the belt may be formed from right-hand and left-hand modules 30a/30b, at least the outer portions of which do not carry pins, so that there are no pins along the edges of the belt.

The above described brattice belt is driven by banks of sprocket wheels at each end of the run of the belt, in known manner. As shown in Figures 7 and 8, the teeth 38 of a sprocket 39 engage the indentations 37 and the ribs 34 and bosses 35,36 engage the indentations 42,43 between the teeth 48. The indentations 43 preferably are shallower and more rounded than the indentations 42, to accommodate the shape of the bosses 35 and 36.

Since the material of which each module is made is flexible, and each row of modules can hinge relative to adjacent rows, the belt can "drape" over each sprocket to give a good positive engagement between the belt and the sprocket.

It will be appreciated that the above described brattice belt modules are relatively inexpensive to manufacture and are quick and easy to assemble and disassemble. Also, any damaged or defective modules can be individually replaced in the belt. A further advantage is that, because the modules are made of flexible material, if the belt is overloaded it tends to flex and shed the load, rather than the belt breaking or pins being torn out of the belt.

The fact that the ribs 34 both engage the sprocket and retain the pin, means that the module can be designed with a substantially flat outer surface (important to avoid transported material becoming lodged on the belt) but with a comparatively large volume of material holding the pin, so that the pin is very securely held.

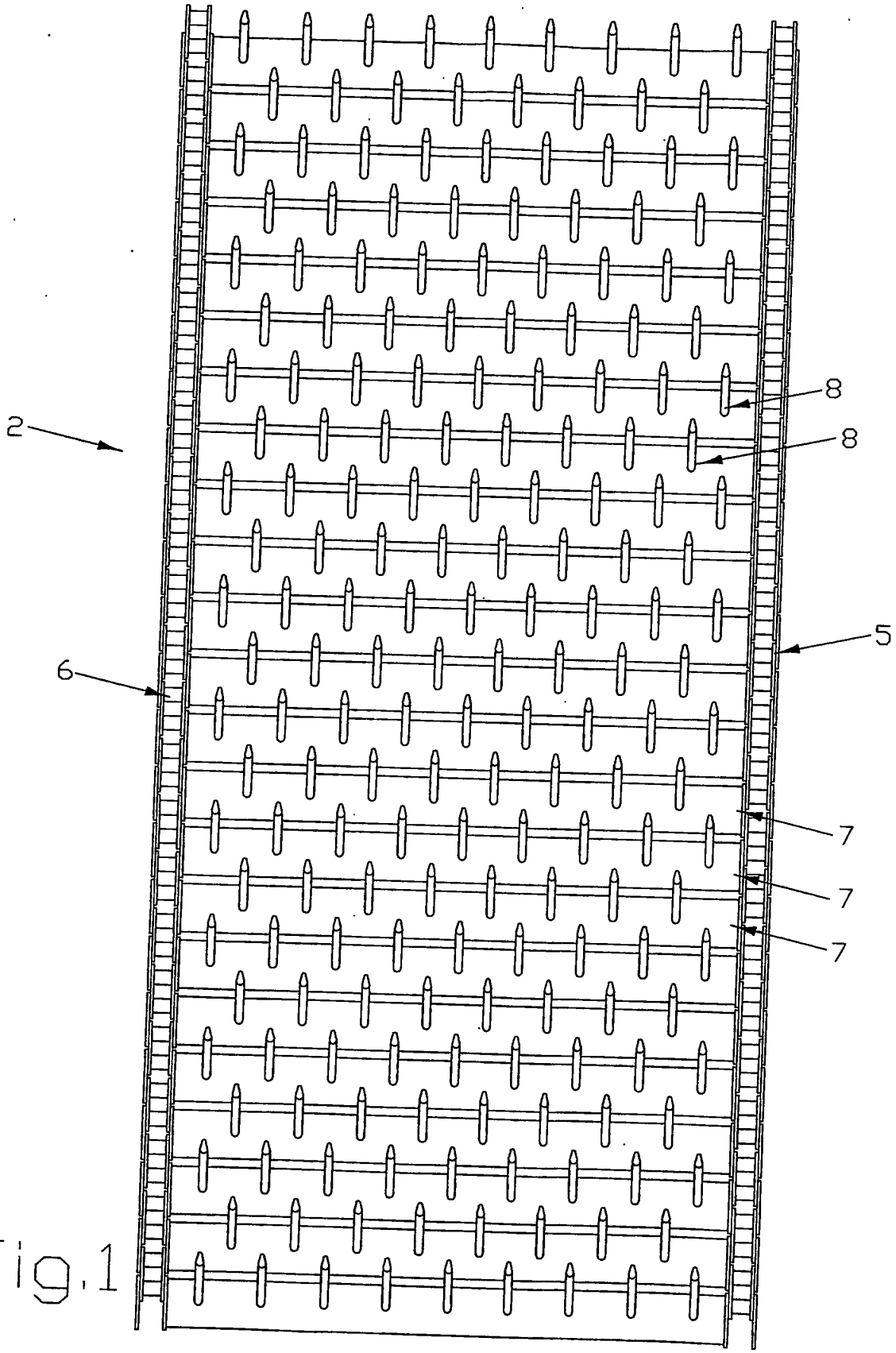
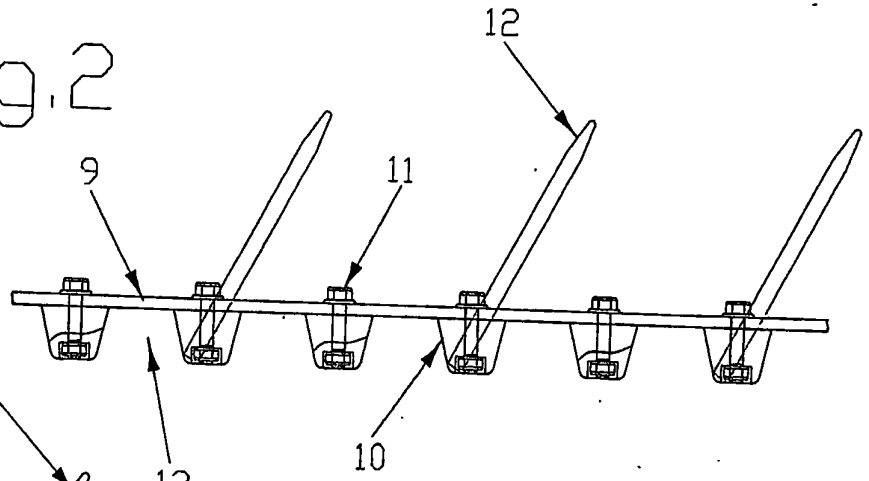


Fig.1

Fig.2



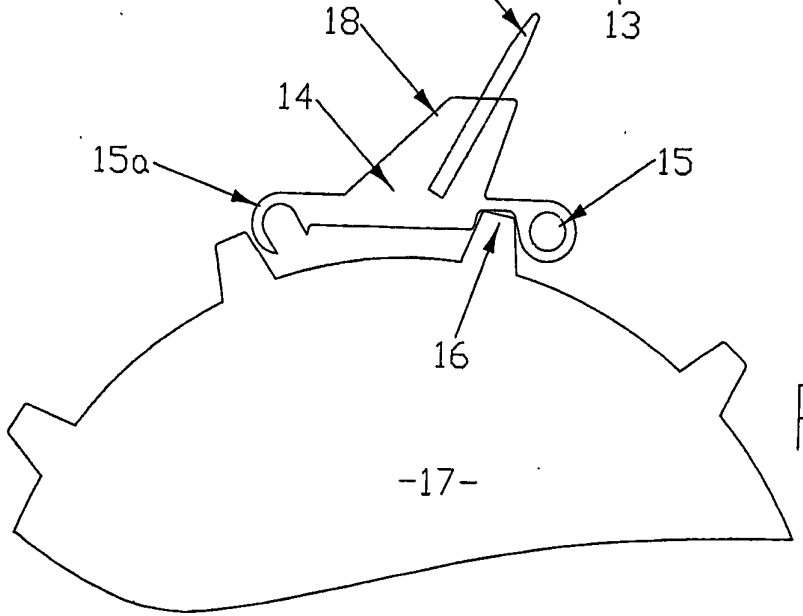


Fig.3

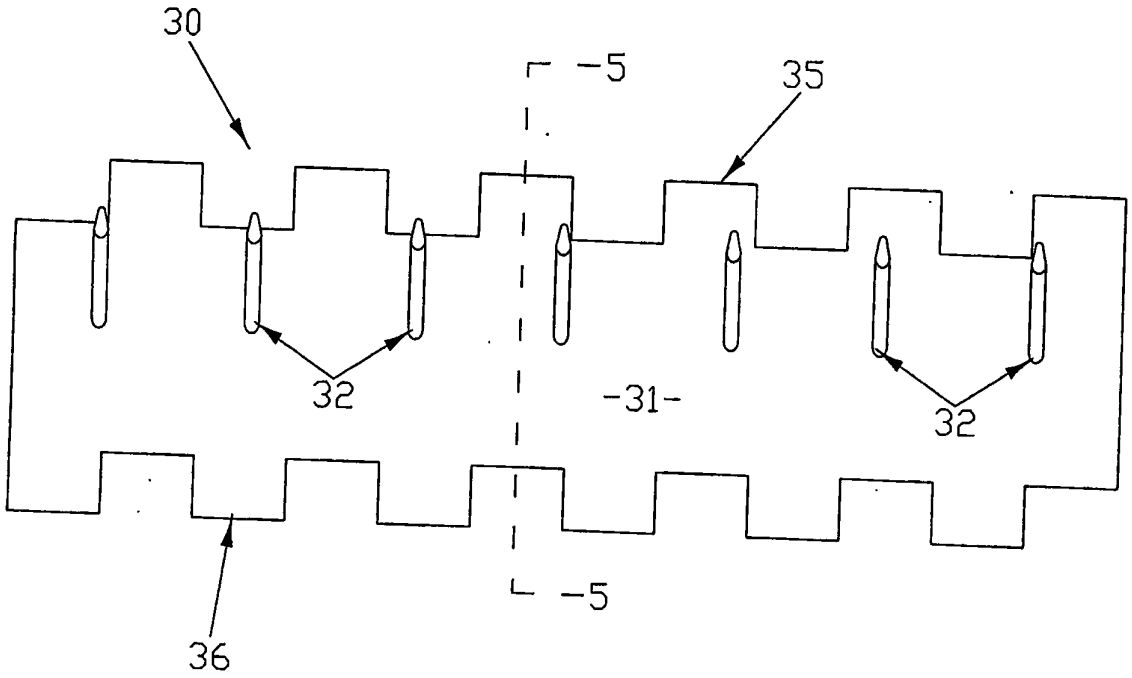


Fig. 4.

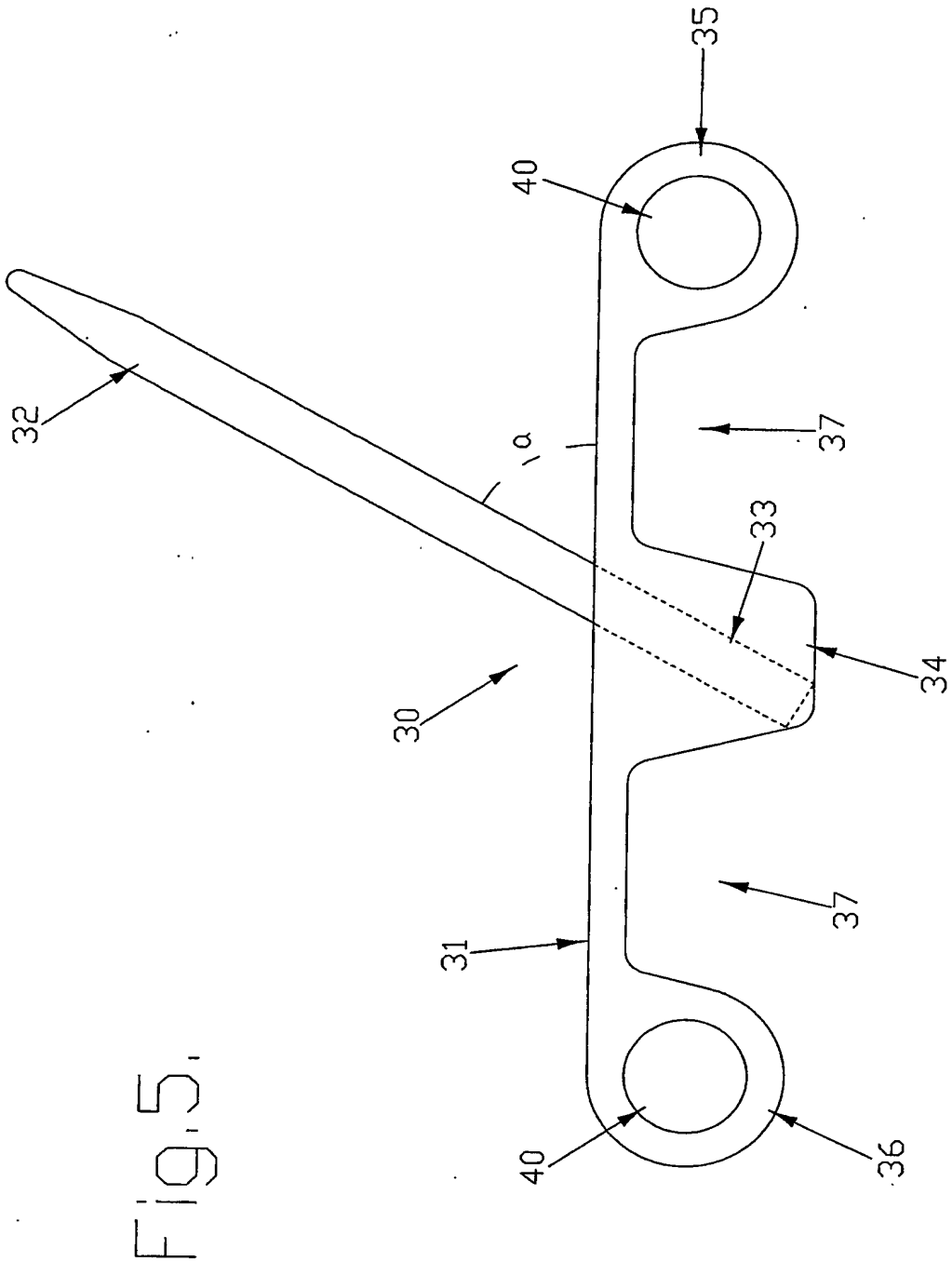


Fig. 5.

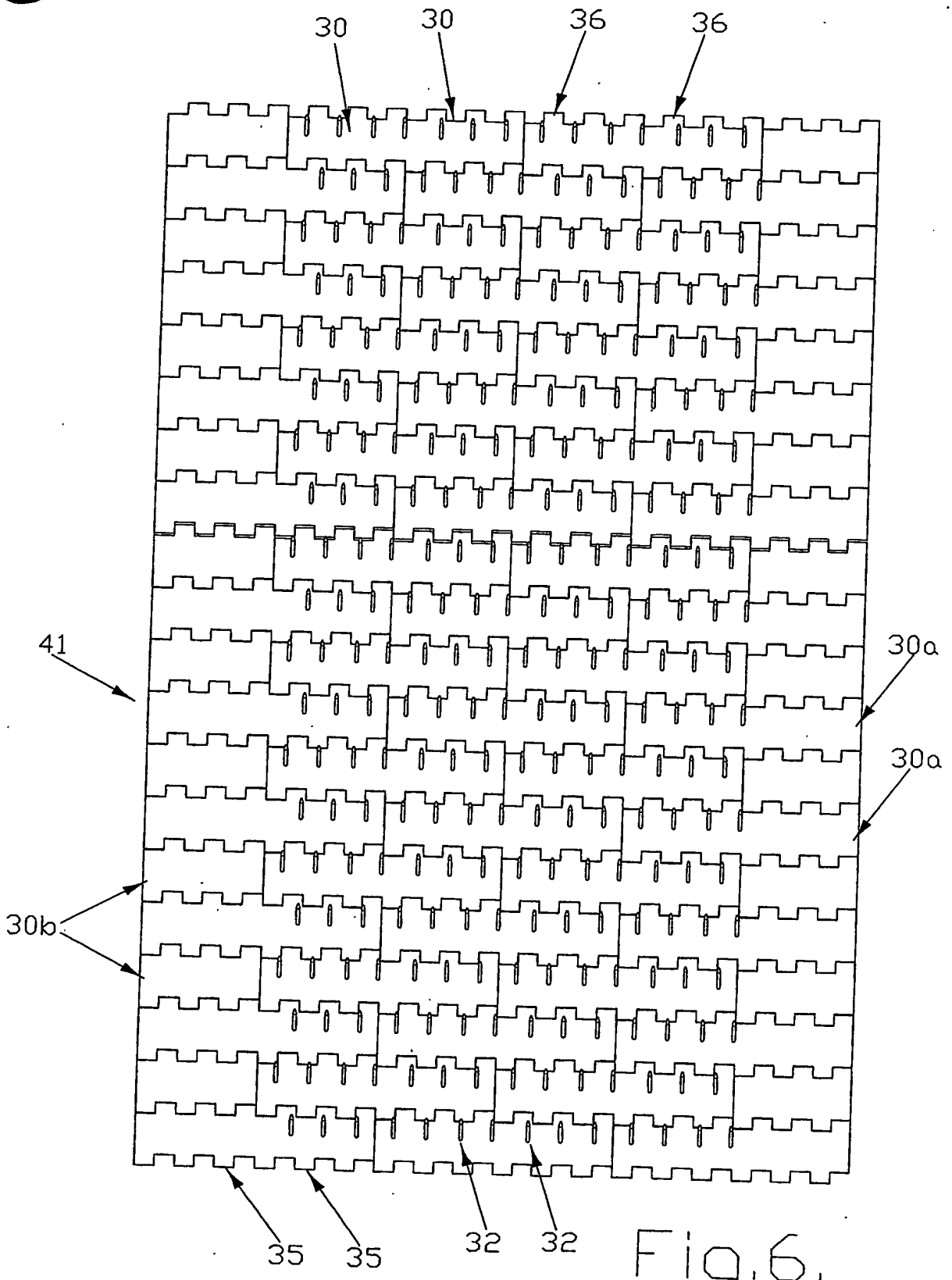


Fig. 6.

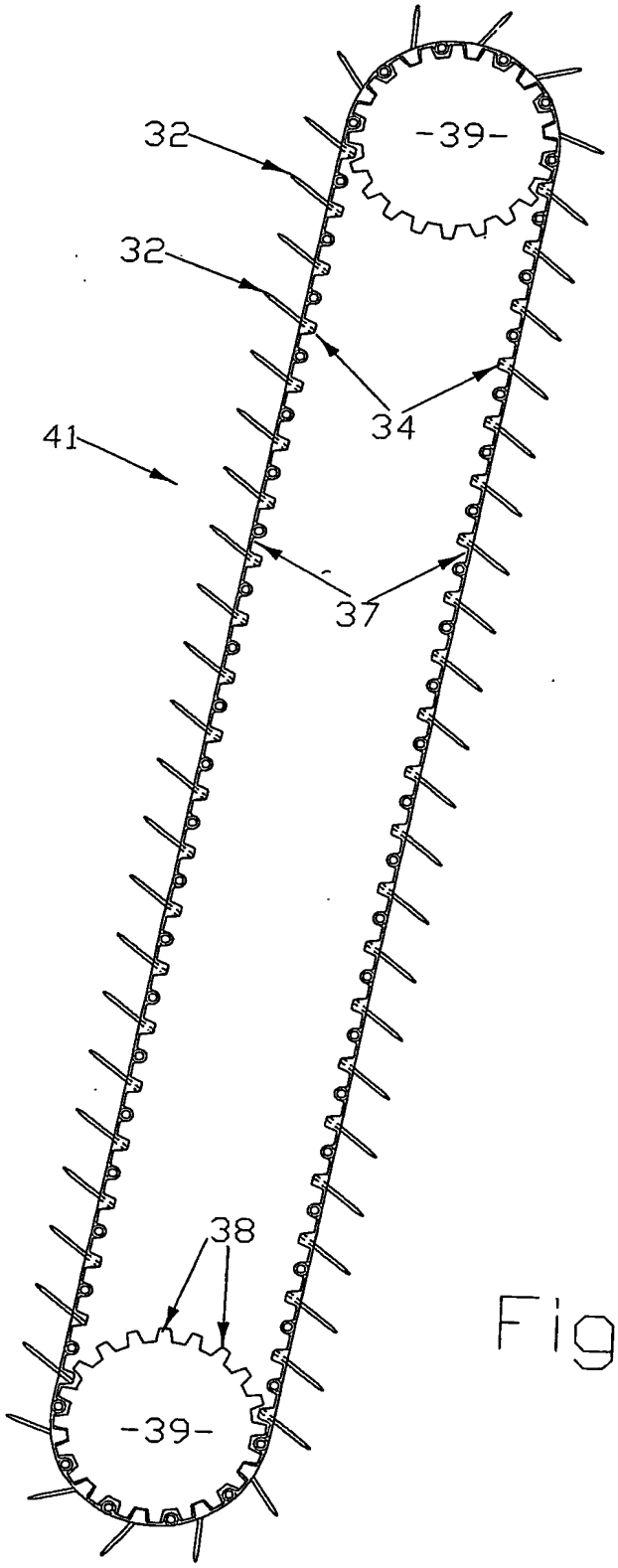


Fig. 7.

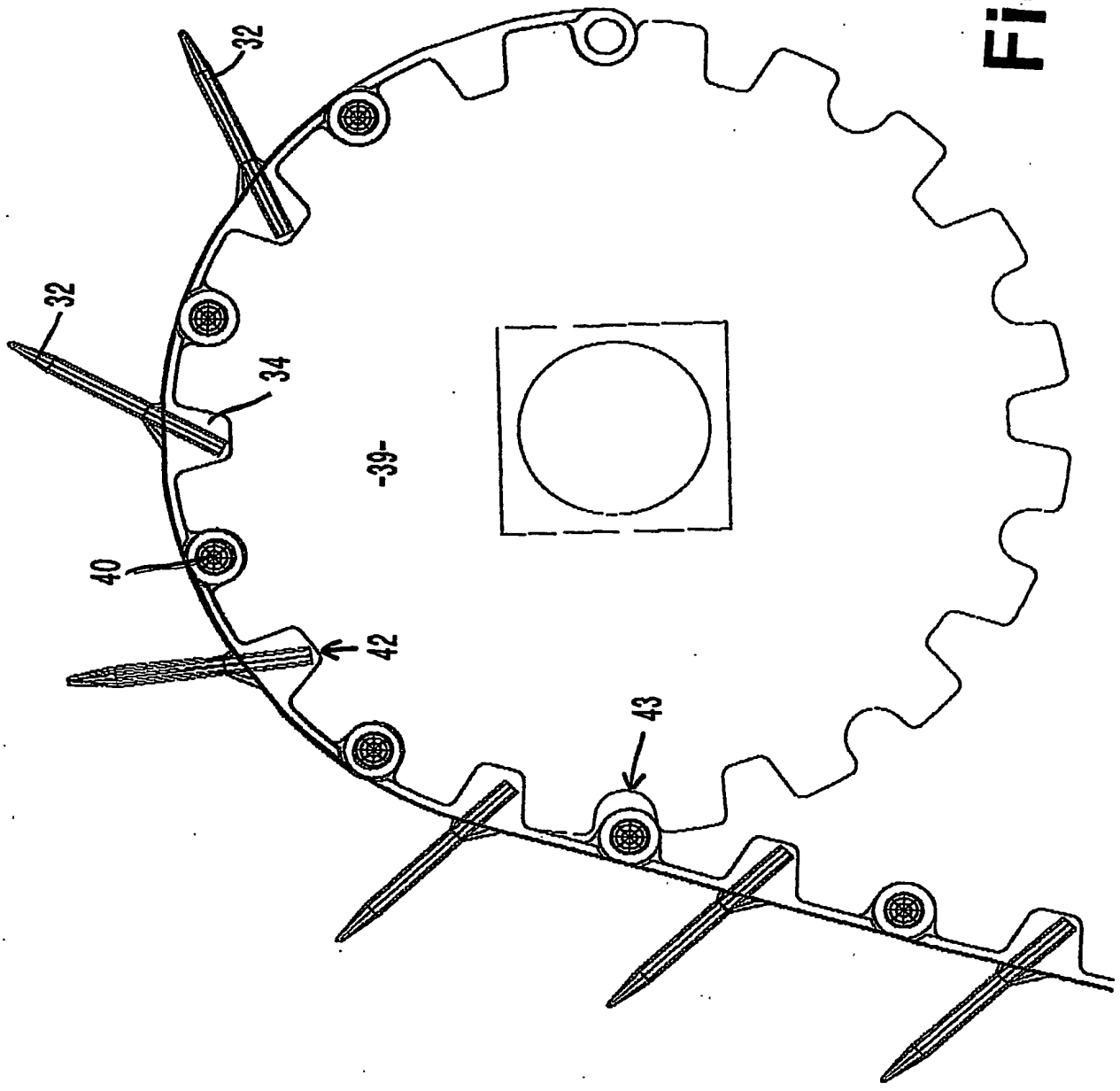


Fig.8